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National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
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MEMORANDUM FOR: Scientific Research Permit No. 1185, SWR-2003-SA-9033:MTM

FROM: for Rodney R. McInnis
Regional Administrator

SUBJECT: Addendum to the Central Valley Programmatic Biological Opinion for Scientific Research

I. CONSULTATION HISTORY

Section 10(a)(1)(A) of the Endangered Species Act of 1973, as amended (ESA), provides the National Marine Fisheries Service (NOAA Fisheries) with authority to grant exceptions to the ESA's "taking" prohibitions for scientific research (see regulation at 50 CFR 222.301 through 222.308, and 50 CFR 224.101 through 224.102). Scientific research or enhancement permits may be issued to Federal or non-Federal entities conducting research or enhancement activities that involve take of ESA-listed endangered or threatened species. Any permitted research or enhancement activities must: (1) be applied for in good faith; (2) if granted and exercised, not operate to the disadvantage of the endangered species; and (3) be consistent with the purposes and policy set forth in section 2 of the ESA (5 CFR 222.303(f)). NOAA Fisheries prepared this addendum to the Central Valley Programmatic Biological Opinion for Scientific Research (Central Valley Research Opinion; NOAA Fisheries 2003a), signed on September 5, 2003, in compliance with section 7(a)(2) of the ESA (16 U.S.C. 1536).

On December 13, 2001, Natural Resource Scientists, Inc. (NRSI) submitted an application to NOAA Fisheries for a research permit to continue studying outmigrating salmonids in the Merced River. NOAA Fisheries received a revised application on October 28, 2003. The proposed project may result in take of adult and juvenile ESA-listed threatened Central Valley steelhead (CV steelhead; *Oncorhynchus mykiss*). NOAA Fisheries published a notice of receipt of NRSI's permit application in the *Federal Register* on November 28, 2003 (68 FR 66819), announcing the beginning of a 30-day public comment period. Public comments were received and stated in general that the study is appropriate and necessary to obtain data on Central Valley fall-run Chinook salmon (CV fall-run Chinook salmon; *O. tshawytscha*) and some baseline data on CV steelhead.

II. DESCRIPTION OF THE PROPOSED ACTION

Under the authority of section 10(a)(1)(A) of the ESA, NOAA Fisheries proposes to issue Scientific Research Permit No. 1185 (Permit 1185) to NRSI, authorizing take of CV steelhead. The permit would be in effect through June 30, 2009, and would be subject to the limitations of the ESA and the regulations in 50 CFR parts 222, 223, and 224, for the period stated on the permit unless it is modified, suspended, or revoked sooner.

A. Project Activities

NRSI proposes to collect, monitor, and conduct research on outmigrating salmonids by capturing, handling, measuring, tagging, and sampling fish in the Merced River using a rotary screw trap (RST). The purpose of the study is to provide scientific data on outmigrating salmonids in the Merced River and to assess four ongoing fishery management programs: (1) the Memorandum of Understanding between the Merced Irrigation District (Merced ID) and California Department of Fish and Game (DFG); (2) the U.S. Fish and Wildlife Service's Anadromous Fish Restoration Program of the Central Valley Project Improvement Act (CVPIA) for increasing fall-run Chinook salmon production in the Merced River; (3) California Federal Bay-Delta Authority (CALFED) Ecosystem Restoration Program objectives to improve fish management in the Merced River; and (4) the Vernalis Adaptive Management Program, which monitors outmigrating fish during the 30-day spring pulse flow from mid-April to mid-May. The study will target CV fall-run Chinook salmon in the Merced River. Any CV steelhead collected would be measured, weighed, and released as quickly as possible following capture.

Two RSTs will be used to fish from mid-January to the end of June, annually for five years in the Merced River, and will be operated only when water temperatures are below 21 °C. The study will evaluate the number, size, and the timing of downstream migration of juvenile salmonids. One trap will be installed in the lower Merced River at river mile (RM) 11, and the second trap will be installed in the upper reaches of the Merced River immediately downstream from the primary nursery areas at RM 37. The traps will be checked for fry, maintained, and cleaned twice daily during the fishing period and more often if necessary when large fish catches occur and/or heavy riverine debris is present. Water turbidity will be measured daily at the trap site. Captured fish will be temporarily held in aerated 20 liter buckets or 120 liter live wells containing water obtained from the site of capture, net pens secured in the river, or trap live boxes. However, CV steelhead observed in traps will not be retained and will be processed immediately. Processing will begin with placing the fish into a bucket containing a weak, standardized solution of tricaine methanesulfonate (MS-222). Immediately after fish are immobilized by the MS-222, fish will be placed on a wetted plexiglass measuring board, measured to the nearest millimeter fork length, transferred to a wetted container on an electronic scale and weighed to the nearest gram. Water temperature will be monitored and will be maintained within ± 2 °C during processing. After processing, and upon resumption of normal swimming behavior and buoyancy control (*i.e.*, approximately ten minutes), fish will be released near the site of capture in moderate current, well away from natural or man-made structures that

may serve as predator habitat. All data will be recorded on data sheets and entered into computer data files.

B. Action Area

The action area is defined as "...all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR 402.02). The action area for this consultation includes all portions of the lower Merced River from the Merced River hatchery below the Crocker-Huffman dam (RM 52) to the confluence with the San Joaquin River (RM 0).

C. Requested Amount of Take

NRSI has requested annual take authorization for twenty adult and twenty juvenile CV steelhead (Table 1); of these, one adult and one juvenile may die (D. Vogel, NRSI, pers. comm., January 6, 2005). The amount of take requested is based on past work; NRSI has captured only two spawned-out adults and no juveniles during the last five years of this study except for 2003, when NRSI captured 13 adult and 5 juvenile *O. mykiss* which appeared to be rainbow trout of hatchery origin. None of these captured steelhead/rainbow trout died (D. Vogel, NRSI, pers. comm., January 10, 2005).

Table 1: Anticipated Annual Take

Number of Individuals	Species and/or Population and/or ESU	Life Stage	Sex	Origin	Take Activity Category	Location	Date(s)	Details
20	Steelhead - Central Valley, California ESU	Adult	N/A	Naturally produced	Capture, measure, weigh, and release	Lower Merced River	January to June	NRSI expects one mortality
20	Steelhead - Central Valley, California ESU	Juvenile	N/A	Naturally produced	Capture, measure, weigh, and release	Lower Merced River	January to June	NRSI expects one mortality

D. Measures to Reduce the Impacts of the Study

Following are measures that will be implemented to minimize any adverse impacts on listed salmonids during the research activities:

1. NOAA Fisheries has reviewed the credentials of the principal investigators for the proposed research. All investigators are well qualified and have provided evidence of experience working with salmonids or the concepts outlined in the proposed project.

2. NOAA Fisheries has developed nondiscretionary conditions for Permit 1185 that are necessary and appropriate to minimize take of listed salmonids, as described in the permit and Appendix B of the Central Valley Research Opinion. The investigators will ensure that all persons operating under Permit 1185 will be familiar with the terms and conditions therein.

3. NOAA Fisheries will monitor project activities to ensure that the project is operating satisfactorily in accordance with Permit 1185. NOAA Fisheries will monitor actual annual take of ESA-listed fish species associated with the proposed research activities (as provided in annual reports or by other means) and will adjust annual permitted take levels if they are deemed to be excessive or if cumulative take levels are determined to operate to the disadvantage of the salmonids.

4. All persons operating under Permit 1185 will be properly trained and have access to properly maintained state-of-the-art equipment.

5. All salmonids captured and not lethally taken will be processed immediately and then released.

6. To minimize juvenile injury and mortality, traps will be checked twice daily and more often as increases in debris loads or other physical stressors warrant.

7. Trapping may be suspended during high flows, warm water temperatures (above 21 °C), or as necessary to minimize mortalities. Visual observation of weather conditions, stream flows, fish behavior, and electronic records of water temperature will be used to determine the appropriate conditions to suspend trapping.

8. A permanent DFG staff biologist will be on-call during the sampling season to monitor and direct activities as conditions warrant. Crowding of fish in traps or holding containers will be avoided.

9. All equipment that contacts fish, including dip nets, will be rinsed, washed with soap or disinfected with an iodophore, and dried between uses.

10. Daily release locations within the same general vicinity will be randomized to avoid habituation of any predators in the area to particular release locations.

III. STATUS OF THE SPECIES AND CRITICAL HABITAT

The issuance of Permit 1185 may potentially affect CV steelhead. The recently issued Central Valley Research Opinion describes the status of the CV steelhead ESU. The current status of CV steelhead, based on the ESU's risk of extinction, has not significantly improved since the species was listed (NOAA Fisheries 2003b). CV steelhead have declined from an average of approximately 11,000 adult fish in the late 1960s and 1970s, to approximately 2,000 fish through the early 1990s (McEwan 2001). Recent estimates (1998 through 2000) from trawling data in the Sacramento-San Joaquin Delta suggest that an average of approximately 3,600 wild female steelhead spawn in the Central Valley basin, and that an average of 181,000 wild juveniles are produced (NOAA Fisheries 2003b). The ratio of wild versus hatchery-produced fish averages 0.148; hatchery fish are not protected by the ESA (NOAA Fisheries 2003b). The future of CV steelhead is uncertain because reliable estimates of steelhead abundance for different basins are not available (McEwan 2001).

As described in the Central Valley Research Opinion, factors affecting CV steelhead and habitat include: (1) dam construction that blocks previously accessible habitat; (2) water development activities that affect water quantity, water quality, and hydrographs; (3) land use activities such as agriculture, flood control, urban development, mining, and logging; (4) hatchery operation and practices; (5) harvest activities; (6) ecosystem restoration actions; (7) natural conditions; and (8) scientific research. Large dams are present on almost every major tributary to the Sacramento River, San Joaquin River, and Delta, and block steelhead access to the upper portions of watersheds that represent approximately 80 percent of historical habitat. Water diversions directly entrain fish, and can affect habitat for example by reducing wetted area and causing water temperatures to increase. Runoff from agricultural, urban, and other sources contains pollutants and suspended sediment, which affects water quality. Hatchery fish can compromise the genetic integrity of wild stocks, and fishing pressure on wild stocks can increase during years of high hatchery production. Habitat restoration projects can temporarily cause disturbance and increased suspended sediment in waterways, but ultimately may increase habitat abundance and complexity, stabilize channels and streambanks, increase spawning gravels, decrease sedimentation, and increase shade and cover for salmonids. Cycles in ocean productivity and drought conditions can have corresponding effects on salmonid life history parameters such as growth, recruitment, and mortality. Scientific research can lead to harm, harassment, and death of listed salmonids, but generally is thought to affect only a small number of fish in this manner. The knowledge gained from scientific research may lead to improved management of listed ESUs, increased population sizes, and consequently increased likelihood of survival and recovery.

Critical habitat is not designated for CV steelhead ESU, and the research activities described in this document will not result in any changes or effects to salmonid habitat. Therefore, NOAA Fisheries will not discuss critical habitat further in this document.

IV. ENVIRONMENTAL BASELINE

A. Status of the Species and Critical Habitat in the Action Area

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species within the action area. The environmental baseline " includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous withe the consultation in process" (50 CFR 402.02). CV steelhead have experienced declines in abundance in the past several decades. Factors that currently may limit steelhead populations in the lower Merced River include impedance of passage during critical life stages, high water temperatures, and reduced quality and availability of habitat (NOAA Fisheries 1996a). Due in part to the long-term scarcity or absence of *O. mykiss* in the entire San Joaquin Basin (DFG 1993), no distinct steelhead run is thought to inhabit the Merced River, although large adult *O. mykiss* enter Merced River Hatchery from time to time (DFG 1993; Moyle *et al.* 1996; NOAA Fisheries 1996b). Little or no historic record of escapement is available.

B. Factors Affecting the Species and Habitat in the Action Area

The Merced River has been affected by a range of human activities, including dam construction for water storage and diversion, land use conversion, introduction of exotic plant and animal species, gold and aggregate mining, and bank protection (Stillwater Sciences 2002). These kinds of modifications are known to change habitat such as water temperature, flow, and availability of spawning and rearing habitat that are critical to CV steelhead (NOAA Fisheries 1996a). Efforts to restore the Merced River corridor to benefit anadromous fish and other species are being planned, and some implementation is occurring at present (Stillwater Sciences 2002).

1. Barriers, Water Diversions and Unscreened Diversions.

There are four major permanent barriers on the Merced River. New Exchequer Dam (RM 65) was built in 1967 to enlarge a pre-existing dam that was built in the 1926, while McSwain Dam (RM 56) was completed in 1966. These dams were built for irrigation, flood control, and power production. Merced Falls (RM 55) and Crocker-Huffman (RM 52) dams are the two other dams, which are low diversion dams and located below McSwain Dam. Collectively, these dams are known as the Merced River Development Project, owned and operated by Merced Irrigation District, and licensed by the Federal Energy Commission (FERC; Stillwater Sciences 2002). New Exchequer Dam has the capacity to store 1,024.6 thousand acre-feet (TAF) of water. McSwain Dam adds 9.73 TAF of storage, whereas Merced Falls and Crocker-Huffman dam have a capacity of 0.9 TAF and 0.2 TAF, respectively. The existence of dams is one of the major factors contributing to the decline CV steelhead by limiting access to historical habitat (NOAA Fisheries 1996a). Historical accounts suggest that salmon occurred up to an elevation of approximately

2,000 feet near El Portal on the Merced River (Yoshiyama 1999). By 1925, Crocker-Huffman, Merced Falls, and Exchequer dams limited access to upstream salmon and steelhead habitats. Currently, only the reach downstream of Crocker-Huffman Dam is accessible to these species. Crocker-Huffman and Merced Falls dams are equipped with fish ladders to allow upstream passage of adult salmon and steelhead. However, these ladders were shut down when the Merced River Hatchery was constructed and are no longer in use (Stillwater Sciences 2002).

Since most of the Merced River corridor is privately owned below Crocker-Huffman dam, there are several diversion dams owned and operated by Merced ID or riparian water rights diverters, as well as several unaccountable diversions along the river. Many of the diversions are unscreened or inadequately screened. From Crocker-Huffman dam to Shaffer bridge, there are seven riparian rights small diversions. Downstream of Shaffer Bridge, DFG has identified 238 diversions, which are typically pumps to supply water for agricultural use (Odenweller 2004; Witts and Raquel 2004). Studies have shown that water diversions reduce survival of emigrating juvenile salmonids through direct losses at unscreened or inadequately screened diversions, and indirect losses resulting from reduced stream flows. Fish losses at diversions can result from physical injury, impingement, entrainment, or predation. Delayed passage, increased stress, and increased vulnerability to predation may contribute to indirect mortality at diversions (NOAA Fisheries 1996a, Odenweller 2004). In one of DFG's pre-screening evaluations of salmonid entrainment on a small riparian diversion on the Merced River near Snelling, DFG found that the existing screen was inadequate to effectively keep fish from being entrained in the diversion canal. DFG captured rainbow trout, Chinook salmon, hardhead (*Mylopharodon conocephalus*), Sacramento pikeminnow (*Ptychocheilus grandis*), *etc.* in the canal during their evaluation (DFG 2002)

2. Flow

Flow conditions in the Merced River are affected by storage, diversion, and flood control due to the presence of the dams mentioned above. The river is approximately 150 miles in length and drains 1,276 square miles of watershed originating in Yosemite National Park. The Merced River is heavily allocated for agricultural water use from the dams that are owned and controlled by Merced ID. Merced ID diverts an average of 522 TAF of water annually from the mainstem Merced River at Merced Falls Dam and Crocker-Huffman Dam. This represents 52 percent of the average unimpaired discharge from the watershed. Merced ID also is required to release 94 TAF annually from Crocker-Huffman Dam for the Merced River riparian water users (Stillwater Sciences and EDAW 2001).

In addition to flow storage and diversion for agricultural supply, the U.S. Army Corps of Engineers limits flow in the Merced River for flood control. A total of 350 TAF of storage space in New Exchequer Dam reservoir is reserved for flood control between October 31 and March 15, and an additional 50 TAF is reserved for forecasted spring snowmelt between March and May 15. The flood control release rules limit the maximum flow release from the Merced River Development Project to 6,000 cubic feet per second (cfs) as measured at the U.S. Geological

Survey (USGS) gauge Merced River at Stevinson, which is located near the confluence with the San Joaquin River (Stillwater Sciences 2002).

Flow regulation and flood control have reduced the frequency and magnitude of 1.5-, 2-, 5-, and 10-year floods in the Merced River by 80 to 84 percent, resulting in changes to geomorphology of the river and habitat downstream of Crocker-Huffman dam. Flows equivalent to the pre-dam channel-forming flow have not occurred since completion of New Exchequer Dam. In addition, flow regulation has shifted the timing of peak flows from spring to winter. This shift from spring peaks to winter peaks likely affects riparian vegetation establishment along the river corridor because native riparian species germinate in spring, and plants germinating in areas inundated in spring are vulnerable to drowning and scour during the following fall and winter. Currently, the distribution of Merced River riparian vegetation downstream of Crocker-Huffman Dam generally is fragmented and narrow compared to historical accounts (Stillwater Sciences 2002). Such conditions have reduced the amount of shaded riverine aquatic habitat available to lower water temperatures in the summer and provide refugia for rearing juvenile CV steelhead. In addition, changes in the magnitude and timing of reservoir releases can influence the timing of steelhead migration. Relatively early attraction of steelhead into tributaries can be triggered by occasional reservoir releases of cold water or the occurrence of high flows early in the fall. Conversely, low flows and higher water temperatures can inhibit or delay migration to spawning areas. Unnatural and/or rapid flow fluctuations downstream of reservoirs can cause dewatering of redds and stranding of juveniles. Because rearing steelhead may be present year-round, suitable flows are necessary throughout the year. In many streams, flows and water temperatures are most critical during the summer. The stream reaches that are presently accessible to steelhead often lack the summer habitat conditions needed to sustain juvenile steelhead through their freshwater rearing period. These unsuitable conditions, which are exacerbated by reservoir operations and water diversions that reduce summer flows, and can be particularly severe in drought years (NOAA Fisheries 1996a, Dennis McEwan, DFG, pers. comm. 2001, 2002).

3. Water Temperature

As described in the Central Valley Research Opinion, water temperature is a primary factor limiting natural steelhead production in many Central Valley streams. Although cold water releases occur below some dams, the amount and quality of habitat available for steelhead rearing below these dams is a fraction of what was once available. Most of the time cold water releases are not available below many migration barriers, or are only possible when reservoirs are at capacity. Appropriate water temperature regimes below many dams cannot be maintained at levels comparable to temperatures achieved naturally in the upper watersheds that once provided habitat (NOAA Fisheries 1996a). Currently, water temperatures in the Merced River and the effects of water temperature on aquatic biota are being assessed by Merced ID. In 2001, a feasibility study on water temperature management for the Merced River was funded to identify and recommend alternatives to improve management for salmonids in the Merced River (Stillwater Sciences 2002).

4. Water Quality

The Merced River has been identified by the Central Valley Regional Water Quality Control Board as impaired due to the usage of agricultural pesticides diazinon, chlorpyrifos, and group A pesticides (*i.e.*, aldrin, dieldrin, chlordane, endrin, heptachlor, heptachlor eposide, hexachlorocyclohexane, lindane, endosulfan, and toxaphene. The U.S. Environmental Protection Agency (EPA) considers diazinon and chlorpyrifos to be of a higher priority than Group A pesticides in controlling the usage of these pesticides and improving the water quality in the Merced River (EPA 2000a and 2000b).

Diazinon is applied during the winter rainy season to control woodboring insects in dormant almond orchards (Dubrovsky *et al.* 1998). Because it is applied during the rainy season, diazinon can be transported to the river by rain and run-off when CV steelhead may be present. Diazinon is moderately mobile and persistent and is highly toxic to birds, mammals, terrestrial insects, freshwater fish, and aquatic insects (EPA 2000a). Studies have have shown that exposure of salmonids to diazinon can result in diminished responsiveness to predators and reduced homing responses (EPA 2000a). The EPA currently is evaluating the need to discontinue and phase out diazinon usage in the United States (EPA 2000a).

Chlorpyrifos is used to protect grain and a variety of orchard and row crops during the March to September irrigation season (*e.g.*, to control worms in alfalfa and sugarbeets, and codling moths and twig borers in walnuts and almonds) (Stillwater Sciences 2002). Ecological risk assessment indicates that risks to birds, fish (*i.e.*, salmonids), and mammals are high and risks to aquatic invertebrates are very high (EPA 2000b). Fish and aquatic invertebrate mortality can result from application rates as low as 0.01 pounds/acre. In addition, chlorpyrifos bioaccummulates in the tissues of aquatic organisms and, due to its acute toxicity and persistence in sediments, is hazardous to bottom feeding species (Extoxnet 2001).

5. Hatchery Operations

The Merced River Hatchery, located below Crocker-Huffman Dam, was built in 1970 by Merced ID with funds provided by the California Department of Water Resources (DWR), and is operated by DFG. This is the only salmon hatchery on the San Joaquin River south of the Delta (DFG 1993). Hatchery production is small relative to the Mokelumne River Hatchery and Feather River Hatchery. Its primary objective is to supplement natural production and help restore and maintain a healthy salmon run that supports sport and commercial fisheries. Revised hatchery production protocols utilize best management practices such as non-selective mating procedures and maintaining genetic diversity by spawning fish over the the entire duration of the natural run to ensure expression of full run-time. The Merced River Hatchery produces and provides juvenile salmon for sustaining and supplementing salmon runs on the Merced, Tuolumne, and Stanislaus rivers, as well as providing juvenile salmon for study purposes throughout the San Joaquin basin. Its production success led to the closure of the ladders at the Crocker-Huffman and Merced Falls

Dams resulting in more limited access by CV steelhead to their habitat in the upper reaches of the the Merced River (Stillwater Sciences 2002).

6. Spawning Gravels

Spawning success (*i.e.*, egg hatching and fry emergence) is highly dependent on flow, temperature, and dissolved oxygen levels during the development of embryos and growth of the fry (Kondolf and Wolman 1993, Barnard and McBain 1994). Barnhart (1986) noted the existence of gravels with high permeability and few fines (less than five percent sand and silt by weight) in highly productive steelhead spawning streams.

In the Merced River, sediment supply from the upper 81 percent of the watershed is intercepted by New Exchequer Dam. Because the dam intercepts the sediment supply from the upper watershed, erosion of the river bed and banks and input from Dry Creek are currently the only sources of coarse sediment to the river. Dry Creek joins the Merced River at RM 31.7 and is only major tributary to the river downstream of Crocker-Huffman Dam. Sediment supplied from Dry Creek consists primarily of sand but includes some gravel. The creek enters at an in-channel mining pit, which captures most of the sediment delivered from the Dry Creek watershed. At the same time, bedload stored in the river channel and floodplain downstream of the dams has been removed by gold dredging and aggregate mining. Based on Stillwater Sciences baseline evaluation report, bedload sediment supply from the upper watershed was estimated to be roughly 11 to 21 thousand tons per year between 1926 and 1946. Downstream of the dams, an estimated 7 to 14 million tons of bedload, or 350 to 1,350 times the natural annual bedload supply from the upper watershed, has been removed from the channel by mining. Sediment transport continuity through the Merced River is interrupted by a series of gold dredging and aggregate mining pits. At these pits, channel slope, depth, and width have been modified to the extent that all bedload being transported from upstream reaches is deposited into the pits. Reaches downstream of the pits are deprived of upstream bedload supply, causing scour of the bed and banks to restore the bedload supply (Stillwater Sciences 2002). This indicates that the Merced River is deprived of sediment/gravel below dams and downstream of instream aggregate mining pits. This lack of bedload supply includes gravels that may be utilized as spawning gravel by CV steelhead.

7. Habitat Restoration and Monitoring Studies

There are several restoration projects currently being implemented or planned along Merced River. Most of these projects are geared for Chinook salmon; however, some of the objectives and components of these projects are beneficial to CV steelhead (*e.g.*, fish passage improvement, gravel augmentation, riparian restoration, and fish studies).

The Merced River Salmon Habitat Enhancement Project is being implemented by DFG, working with DWR. The project will reconstruct the river channel and floodplain through 4.3 mile reach of the Merced River that has been excavated for aggregate mining. The objectives of the project

are to reduce predation on young salmon by non-native fish by isolating habitat in the river-captured-mining pits; restore salmon spawning habitat; enhance passage of adult and juvenile salmon; resize the channel and floodplain to restore some natural river processes; and re-establish riparian vegetation. Two of four phases of this project have been completed.

The Chinook Salmon Spawning Gravel Augmentation Project and the Magnuson Predator Isolation Project are two earlier projects implemented by DFG and DWR. These projects improved fish passage in the lower Merced River by reconstructing a berm around a gravel pit mining pit, isolating predators, and restoring the instream habitat with suitable spawning gravel for in the upper reaches.

In 1998, DFG obtained funding from CALFED to purchase the Merced River ranch, a 318-acre parcel located on the south bank of the river downstream of Crocker-Huffman Dam. DFG plans to use the site as a source of sand, gravel, and cobble for the future restoration projects and as a floodplain restoration site.

Along the Merced River, near the confluence, the James J. Stevinson Corporation is in the process of placing a conservation easements on nearly 9,000 acres of its landholdings. This easement will protect 2,931 acres of riparian habitat and floodplain which comprise the largest remaining patches of riparian forest along the Merced River, and will serve to expand two wildlife refuges. This will create and provide the opportunity for habitat enhancement along the river and additional water to be delivered in the river (Riviere *et al.* 2000).

The Merced River Corridor Plan was developed by Stillwater Science and funded by CALFED. It is a restoration plan for the Merced River. The restoration plan is designed to provide a technically sound, publicly supported, and implementable plan to improve geomorphic and ecological functions in the Merced River corridor from Crocker-Huffman Dam to the confluence with the San Joaquin River. The overall goal is to improve, to the extent feasible, ecological conditions in the Merced River to benefit native fish and wildlife and recognize, protect, and address concerns and rights of property owners and other stakeholders (Stillwater Sciences 2002).

DFG and Merced ID jointly developed and agreed upon a formal 10-year study program to determine the potential factors that may limit salmonid production in the Merced River. This program is designed to evaluate the habitats necessary for increased salmon production by assessing the needs of each freshwater salmon life stage (*i.e.*, upstream migration, spawning, egg incubation, fry and juvenile rearing, and outmigration). Both parties have agreed upon increasing stream flows to benefit salmon in the lower Merced River.

V. EFFECTS OF THE ACTION

The purpose of this section is to identify effects on ESA-listed CV steelhead associated with NOAA Fisheries' issuance of Permit 1185. The primary effects of the proposed activities on ESA-listed salmonids are expected to be related to harassment associated with intentional take. Harassment generally leads to stress and other sub-lethal effects and will be caused by capturing and handling fish. The applicant expects that some mortality may occur during handling or after the fish have been released.

A. Project Specific Effects

Potential capture and handling effects on salmonids are described in detail in the Central Valley Research Opinion. Capture in nets may cause stress from crowding or abrasion. Stress from handling may result from excessive doses of anesthetic, differences in water temperatures (between the original habitat and the containers in which the fish are held), depletion of dissolved oxygen, holding fish out of the water, and physical trauma. These effects may be sufficient to cause injury by impairing juvenile growth rates or causing disorientation which may increase the probability of predation. Direct mortality of juveniles and adults may occur from suffocation or excessive abrasion if fish are trapped in the folds of a net. NOAA Fisheries expects that the effects of capture and handling generally will be short-lived and will not cause more than the expected take activities described in Table 1 (*Anticipated Annual Take*). Steelhead will not be targeted for capture in the proposed study (D. Vogel, NRSI, pers. comm., January 10, 2005). Injurious take from capture and handling should be avoided or minimized by employing accepted techniques (*e.g.*, emptying traps regularly, using wetted hands and nets to handle fish, *etc.*) to minimize stress and ensure fast processing times and gentle handling (See section III, *Description of the Proposed Action*). The requested amount of take for CV steelhead is not expected to result in a significant effect at the scale of the Evolutionarily Significant Unit (ESU) because both the anticipated non-lethal take and mortality rates are very low relative to the size of the ESU (*i.e.*, annually less than 0.6 percent and 0.03 percent, respectively).

B. Beneficial Effects of Issuing the Permit

The status reviews for CV steelhead lament the lack of data available for making satisfactory management decisions (Busby *et al.* 1996). The lack of reliable and widespread abundance and trend data is in itself a risk factor for CV steelhead. Access to useful scientific information is essential to implement the ESA adequately. Scientific information is necessary to reduce uncertainty in determining whether a consultation is to be conducted formally or informally; when determining whether a jeopardy threshold is met; or when developing terms and conditions, reasonable and prudent measures, and reasonable and prudent alternatives. Also, monitoring activities can help NOAA Fisheries determine if protective actions are assisting in the recovery of CV steelhead.

C. Summation of Project Effects

The risks to ESA-listed salmonids of adverse effects from scientific research are reasonably small and acceptable. Despite the fact that fish are harassed and even killed in the course of research, only a small fraction of available habitat is sampled; therefore, only a small proportion of the total population is subject to sampling and the loss to the total population is small (McMichael 1998). NOAA Fisheries expects that the research, even if the maximum permitted take is reached, will have no more than a negligible adverse effect on the steelhead population within the Merced River or the CV steelhead ESU. The take prohibitions (4(d) rule) for CV steelhead (65 FR 42422) highlight the value of research in the recovery process, acknowledges the paucity of research data, and encourage scientific research. NOAA Fisheries believes that information derived from NRSI research studies will make a significant contribution to the body of science on salmonid biology and assist in management decisions that may lead to the conservation and recovery of salmonids.

VI. CUMULATIVE EFFECTS

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." Future Federal actions, including the ongoing operation of dams, hatcheries, fisheries, water withdrawals, and land management activities will be reviewed through separate section consultation processes and not considered here. Similarly, non-Federal actions that require authorization under section 10 of the ESA, and that are not included within the scope of this consultation, will be evaluated in separate section 7 consultations.

A general summary of potential cumulative effects that may affect CV steelhead within the action area is included in the Central Valley Research Opinion. Future non-Federal actions that may affect the action area include ongoing agricultural activities and continued urbanization related to increased population. These activities may influence river flow, water temperature, sediment load, and water quality in the lower Merced River.

VII. CONCLUSION

After reviewing the best available scientific and commercial information, the current status of the species, the environmental baseline for the action area, the effects of the proposed issuance of Permit 1185, and the cumulative effects, it is NOAA Fisheries' biological opinion that the issuance of Permit 1185, as proposed, is not likely to jeopardize the continued existence of CV steelhead.

VIII. INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the proposed action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

The issuance of Permit 1185 authorizes intentional take of CV steelhead associated with the proposed research activities. NOAA Fisheries does not anticipate incidental take of endangered or threatened species from this action. This biological opinion does not authorize any taking of listed species under section 10(a) or immunize any actions from the prohibitions of section 9(a) of the ESA.

IX. REINITIATION OF CONSULTATION

This concludes formal consultation on the issuance of Permit 1185. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered, (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion, or 4) a new species is listed or critical habitat is designated that may affected by the identified action.

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